Real-time control system for a two-wheeled inverted pendulum mobile robot

Sophan Wahyudi Nawawi, Johari Halim Shah Osman

Introduction:

The research on two-wheeled inverted pendulum (T-WIP) mobile robots or commonly known as balancing robots have gained momentum over the last decade in a number of robotic laboratories around the world (Solerno & Angeles, 2003;Grasser et al., 2002; Solerno & Angeles, 2007;Koyanagi, Lida & Yuta, 1992;Ha & Yuta, 1996; Kim, Kim & Kwak, 2003). This chapter describes the hardware design of such a robot. The objective of the design is to develop a T-WIP mobile robot as well as MATLABTM interfacing configuration to be used as flexible platform which comprises of embedded unstable linear plant intended for research and teaching purposes. Issues such as selection of actuators and sensors, signal processing units, MATLABTM Real Time Workshop coding, modeling and control scheme is addressed and discussed. The system is then tested using a well-known state feedback controller to verify its functionality.